WHAT IS CLAIMED IS:

1. A system for recognizing shape of a staircase or other polyhedron based on an image input from photographic means, comprising:

at least one camera as the photographic means,

region selection means for selecting a predetermined region to be processed further for detailed analysis within the image photographed by the camera,

processing region setting means for obtaining a range image from the image obtained by the camera and for setting a processing region upon the obtained range image based on the selected region, and

polyhedron shape recognition means for recognizing the shape of the polyhedrons based on the range image within the set candidate range.

2. A system according to claim 1, wherein the photographic means comprises at least two cameras, and the region selection means selects the predetermined region within the image photographed by one of the two cameras, and the processing region setting means obtains the range image from the image obtained stereoscopically from the two cameras.

3. A system according to claim 1, wherein the region selection means extracts groups of line segments that are longer than a predetermined length from within the photographed image, and selects the predetermined region based on positions of the extracted groups of line segments.

4. A system according to claim 3, wherein the region selection means

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selects the predetermined region based on the positions of groups of line segments that are parallel to each other within the extracted groups of line segments, and that are groups of line segments that are close in distance.

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5. A system according to claim 1, wherein the polyhedron shape recognition means extracts sets of points constituting the range image within the processing region as sets of range data in a three-dimensional space and recognizes the shape of said polyhedron based on the extracted sets of points.

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6. A system according to claim 5, wherein the polyhedron is a staircase and the polyhedron shape recognition means assumes the extracted set of points to be an inclined plane, and recognizes the shape of said staircase by finding

15 an approximate plane.

7. A system according to claim 5, wherein the polyhedron is a staircase and the polyhedron shape recognition means sections the extracted set of

20 points along vertical planes, and recognizes the shape of the staircase based on an error between the sets of points on the cross-sectional planes and a two-dimensional model.

25 8. A method of recognizing shape of a staircase or other polyhedron based on an image input from at least one camera, comprising the steps of:

(a) selecting a predetermined region within the image photographed by the camera,

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(b) obtaining a range image from the image obtained by the camera and setting a processing region upon the obtained range image based on the selected region, and

(c) recognizing the shape of the polyhedrons based on the range image within the set candidate range.

9. A method according to claim 8, wherein the step (a) selects the predetermined region within the image photographed by one of at least two cameras, and the step (b) obtains the range image from the image obtained stereoscopically from the two cameras.

10. A method according to claim 8, wherein the step (a) extracts groups of line segments that are longer than a predetermined length from within the photographed image, and selects the predetermined region based on positions of the extracted groups of line segments.

11. A method according to claim 10, wherein the step (a) selects the predetermined region based on the positions of groups of line segments that are parallel to each other within the extracted groups of line segments, and that are groups of line segments that are close in distance.

12. A method according to claim 8, wherein the step (c) extracts sets of points constituting the range image within the processing region as sets of range data in a three-dimensional space and recognizes the shape of said polyhedron based

on the extracted sets of points.

13. A method according to claim 12, wherein the polyhedron is a staircase and the step (c) assumes the extracted set of points to be an inclined plane, and recognizes the shape of said staircase by finding an approximate plane.

14. A method according to claim 12, wherein the polyhedron is a staircase and the step (c) sections the extracted set of points along vertical planes, and recognizes the shape of the staircase based on an error between the sets of points on the cross-sectional planes and a two-dimensional model.

15. A computer program embodied on a computer-readable medium for recognizing shape of a staircase or other polyhedron based on an image input from at least one camera, comprising the steps of:

(a) selecting a predetermined region within the image photographed by the camera,

(b) obtaining a range image from the image obtained by the camera and setting a processing region upon the obtained range image based on the selected region, and

(c) recognizing the shape of the polyhedrons based on the range image within the set candidate range.